ORGAN INSTITUTE QUARTERLY

VOLUME SEVEN NUMBER ONE SPRING 1957

DOM BEDOS DE CELLES 4
THE ART OF THE ORGAN MAKER

LEONARD ELLINWOOD 11
MUSIC IN WASHINGTON CATHEDRAL

EDWARD B. GAMMONS 18
THE GROTON ORGAN

ALEXANDER SCHREINER 25
THE SALT LAKE CITY TABERNACLE ORGAN

FRANKLIN S. MILLER 37
COMMENTS ON THE AGONY OF MODERN MUSIC

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ORGAN INSTITUTE
ANDOVER, MASSACHUSETTS

DOM BEDOS DE CELLES

L'ART DU FACTEUR D'ORGUES
(THE ART OF THE ORGAN MAKER)

TRANSLATION OF CERTAIN PASSAGES WITH NOTES BY W. L. SUMNER

Translator's Preface

The son of Henri Bédos and Jeanne de Pradines, François Bédos was born on January 24, 1709, at Caux (Hérault). The boy showed an interest in mathematics, physics, and music at an early age, like his compatriots Marin Mersenne a century earlier, and Cavaillé-Coll a century later. François became a member of the Benedictine Congregation of Saint Maur at Toulouse on May 9, 1726, and was able to study the works of the Riepp family of organbuilders. In addition, he had contact with other masters of the craft, such as Dallery, the Clicquots, and Le Fevre (Lefebvre, Lefebre, et cetera). He worked as a carpenter and metalworker, and was able to perform all the operations of the craft with his own hands. For many years the actual authorship of the great treatise was a matter of doubt. Barbier and other bibliographers ascribed it to a Benedictine monk called Jean-François Monniotte; but there is a letter extant, formerly in the possession of Fétis, the critic and musicologist, written by Bédos to a M. Nantonville in 1763, in which he says "It is not without much fatigue that I have collected all the material necessary for this treatise on organbuilding: I have been kept busy without relaxation . . . ."

The scientific work of Bédos was recognized by the Academy of Sciences, and he was made a member of that body in Bordeaux and a correspondent of the Paris Academy. In praising his monumental work the officers of the Academy wrote, "There are certain arts which it is difficult to treat properly, not only because they involve an understanding of so much else, but also because the occasions to practice them do not often arise. The work of the organbuilder is in this class:—to do well he must be a mathematician as well as voicer: he must be a master of many skills, all of which contribute to the production of a beautiful and grand instrument. It is towards the perfection of the description of the practical arts with which the Academy has occupied itself, and the work has maintained a high level. Happily all the talents necessary for the task are found in the person of Dom Bédos, and more happily still this religious scientist, motivated by a desire to assist the Academy in perfecting its enterprise, has accepted the invitation to undertake a description of the art of organ building."

Dom Bédos traveled much in France, and also moved from one monastic establishment to another. He was at Saint Croix Bordeaux, in 1746–1748, Saint Bénigne, Dijon, in 1750, St. Thibéry in 1751–1752, Saint Vincent at Mans in 1761–1762, and in many other places. From 1762 until his death on November 25, 1779, he lived at Saint Denis near Paris.

The researches of Felix Raugel, Norbert Dufourcq, and others give us a picture of his "organic" activities. No doubt, today, in the United States he would be called an architect. There are in existence his reports on the Riepp organs at Saint Lazare d'Anton (1748), on those at Saint Nazare de Béziers, at the "college" of Saint Martin de Tours (1761) and documents fixing the prices of organs at Salem (1771) and at Saint Just and Saint Pasteur at Narbonne. He approved the plans of Jean Rich-

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ards for organs at Saint Croix at Bordeaux, Saint Allyre de Clermont, Saint Vincent at Mans, and he made detailed plans for the organ of Saint Pierre at Montepellier.

His first published work was entitled "La Gnomonique pratique ou l'art de tracer les cadrans solaires" ("The art of making sundials").

In France, the eighteenth century was notable for the work of the encyclopedists — Diderot, d'Alembert, and their collaborators. They were inspired by and to a large extent they borrowed from the Englishmen Chambers and John Mills, who finished the original work in France. The Encyclopedia, though uneven in quality, sold well and made enormous profits for its publishers. In the second half of the century, with the aid of the finest papermakers, printers, and engravers in France, the Academy of Sciences produced an improved "cyclopedia" of all the practical arts. The work of Dom Bédos is in four parts, in two large volumes and an atlas of plates, beautifully engraved. These latter start with the principles of mechanics and the use of all the tools involved in organbuilding, and then show every part of the organ and how it is made. Also, there are some fine plates of organ cases; others show the exact methods of pinning barrels—even to the precise nature of musical ornaments—for mechanical organs.

For size and thoroughness Dom Bédos' work has never been excelled. Audsley's handsome two-volume "Art of Organ Building" comes nearest to it in modern times and is also beautifully illustrated, but sometimes betrays the prejudices of the author. Dom Bédos is more objective and authoritative.

Dom Bédos is at his best when he is describing the organs of the Clicquots and Lefevres. When he wrote his books the great high Baroque tradition was obsolescent if not quite obsolete. The noble art of Bach was already giving way to something more frivolous. Bédos does not think it improper to tell us how to use the organ "to make a little bird, the drum and fife band" and so on. Knecht's "Organ Tutor" is the German counterpart of all this. Nevertheless, Bédos gives us faithful accounts of the best in the eighteenth-century organbuilding and the use of the instruments in France. The Revolution was not far off, and when the smoke of battle of the Napoleonic Wars had cleared away, a new organ aesthetic appeared in France after a peroid of complete decadence (1789-1840). Cavaillé-Coll's romantic organs owed little to Clicquot and Dom Bédos, except in nobility of conception and worthiness of structure. The composers Saint-Sàens and Franck, who resuscitated the French school of organ composition, were content to take Cavaillé-Coll's organs, with their orchestral colors and depleted mutationwork, as they found them. It was not until Guilmant, who, at the end of the century, editing the works of the old French organ composers, was able to wring from the organbuilder a bare sufficiency of mutation ranks and mixtures, that the glories of the pre-Revolution organ were hinted at. Happily a few of Clicquot's organs have been thoughtfully restored.

Bédos' work was the basis of most of the treatises on organbuilding which appeared in the nineteenth century. "Seidel" is little more than a German translation, and "Töpfer" and "Allihn" were founded on the work of the French master. Hamel, who was responsible for the volumes of organbuilding in the Roret Encyclopedia (1847), merely added something to Bédos' work. A considerable part of the book was translated into German in 1793 by J. Chr. Vollbeding. A complete "fascimile," somewhat reduced in page size, was published by Bärenreiter in 1934 and sold so well that another edition should be forthcoming.

An English translation has never appeared and would be an expensive and considerable undertaking. With such enormous tomes to work on, the present writer can only offer translated passages and reproductions of typical plates. For the details in the dozens of comprehensive tables prepared by Dom Bédos, the reader must consult a copy of the fascimile edition. The translations which follow concern the structure, stops, registration, and some details of the manufacture of the eighteenth-century organ in France. Dom Bédos' historical introduction, which is often inaccurate, has been omitted entirely.

The work, beautifully printed by L. F. Delatour in 1778, consists of 676 folio pages of text and index, nearly a hundred pages of prefatory material, and 137 plates, some of which are much larger than a page of the work. Each of these plates is a masterpiece of draftsmanship, and many of the plates contain a number of figures and so represent a complete "visual aid" to a sequence of processes. The total number of figures contained in these plates cannot be less than a thousand. Every tiny detail is illustrated, from the mechanical principles of engineering to the finished structure in all its magnificence. No less than twenty-four plates, most of which are large double pages, deal with the precise means of pinning barrels in mechanical organs. Every type of musical ornament is faithfully considered! Chamber organs, which show great ingenunity in packing away pipes, "hurdy-gurdies," harpsichords, pianofortes, and combinations of stringed and wind instruments are all dealt with in detail. Nothing is left to chance or human stupidity; nowhere do we find a lapse from the highest ideals of supreme skill and craftsmanship.

Extracts And Selected Passages From Book One

CHAPTER I

The organ is a musical wind instrument, the greatest and most complete of all, by reason of its extensiveness and the number of its tones. It is composed of a large number of pipes of various kinds, some of tin, some of "metal,"[1] and some of wood, of hosts of various mechanisms necessary and appropriate to the control of the pipes and the wind supply which gives them their utterence; also the large and beautiful pieces of woodwork, wherein all is contained, called the buffet (or case) and there is generally a smaller case in front. Also there are several large bellows, separate from the main body of the instrument, furnishing the wind which they supply to the various soundboards or wind chests, from which it is distributed to each pipe by means of a keyboard which the organist controls with his fingers. One frequently hears the expression *Montre de l'Orgue*—the exterior facade seen in front, which consists in great part of woodwork decorated with architectural ornaments and sculpture, and adorned in its exterior openings with great polished pipes of tin, which one can more appropriately call the *Montre de l'Orgue.*

The remainder of the first chapter and the two following chapters are devoted to a description of the working parts of the organ's mechanism, of the tools employed, of its construction, the various kinds of metal employed. For the present we shall now pass on to chapter four, which describes all known speaking stops.

CHAPTER IV

That which is called a stop in an organ is a range of a certain number of pipes of one particular type, placed generally under the control of a drawstop, or register, which form a succession of sounds of a certain quality of tone in chromatic order.

[1] A lead-tin alloy.

This generally consists of some four octaves. There are some stops which consist of but three octaves and others of but two in extent, for the reason that they are not required for the whole compass; there are some needed for the bass part only, others for the treble part only. All stops of an organ can be classed under two headings, there being two species—the flue stops and the reed stops. As it is desirable to describe these separately, I shall divide this chapter into two parts. In the first I shall describe all the flue stops, and in the second I shall describe all the reed stops.

PART I

The flue pipes are thus named because they speak by means of a mouth, and are constructed in a manner to produce a particular type of tone. The flue pipes are divided into Foundation, Octave, and Mutation stops, which later subdivide themselves into simple and compound stops. The materials of which the pipes of different stops are made are tin, wood, or metal (lead which is mixed with a certain proportion of tin to strengthen it).

Octave-sounding, or foundation stops, are of open or stopped pipes, and generally take their name from the length of the first or largest pipe, which is also the longest. Thus we say a 32′, a 16′, or an 8′ stop, for the reason that in each case it is the length of its longest pipe. But the 4′ stop is called the Prestant, and the 2′ the Doublette. It should be remarked here that a stop of twice the length of another sounds an octave lower. Thus a 32′ sounds an octave lower than a 16′, which gives an octave below the 8′. The Prestant, 4′, accordingly, gives an octave higher than the 8′, and an octave lower than the Doublette.

The Prestant bears this proud name, not on account of the excellence of its tone, but because it is the stop to which all others are tuned. It is preferred for this function for the reason that its pitch lies midway between the deepest and the most acute sounds. The 2′ Doublette is so called because it sounds two octaves above the 8′ stops.

The four principal stops of which I have just spoken, the 32′, the 16′, the 8′, and the Prestant of 4′, give their name to an entire instrument in order to denote and give an idea of its quality or size. Thus we speak of an organ as being a 32′ *en montre*,[2] or a 16′, or an 8′, or a 4′. The largest pipes of these stops are generally placed in the front, *en montre*, or, in other words, displayed in the front of the case, so far as the casework allows. It sometimes happens that the open spaces in the case are too low or too narrow to place the lower pipes of the 16′ Principal in front, so we speak of such an organ as having an 8′ Montre with an open 16′ within. Thus the size, contents, and quality of the organ and its effects are indicated. It is still a 16′ organ though the lower pipes may not be in evidence. The same arguments apply to 4′ fronts.

There are two kinds of stopped pipes. The fully stopped, and the half-stopped (or *à cheminée*[3]); these are halfway stops between the open and the closed. All closed pipes speak an octave lower than open pipes of the same length, and are all termed Bourdons: *à cheminée* pipes partly open and partly closed require approximately the same length of pipe.

Bourdon stops are generally described by a combination of their name and pitch. Thus a stopped 16′ is called a 32′ Bourdon, because it speaks a note in unison with

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[2] The word **monster**, i.e., something to be shown or put on show, has a similar derivation.

[3] That is, with a chimney.

an open pipe of 32′. A stopped 8′ becomes a Bourdon of 16′ and a stopped 4′ a Bourdon of 8′. This last stop is sometimes called the "Bourdon of 4′" or the "little Bourdon," because it is the smallest made.

The foundation and octave stops are not always of complete compass, but for good reason. For instance, it is very rare for 32′ stops to be complete. The instrument is nevertheless called a 32′ organ. One always economizes with the lower four or five pipes, or even seven, eight, or nine, for the reason that these large pipes cost a great deal of money, and because it is also rare and difficult to find sufficient space for such a large organ case as would be required. But the principal reason is that these great pipes require so vast a quantity of wind that they are apt to empty the wind chest. One is limited by the amount of wind that can be furnished by the wind chest, and by the depth and weight of the keyboard touch. If it were a practical proposition to make the touch deep and very heavy, it would be easy enough to employ the longest pipes, and in such a case a wind chest would be provided that could supply the necessary amount of wind. It is different in the case of the Pedal Organ, which has its own separate wind chest, and thus one is not restricted by any insufficient wind supply. Therefore the stop can be made complete throughout its compass; it is then called an organ with a 32′ Flute Pedal.

There are many instruments that can only display as the longest pipe one of 12′ in height, in the case front, the remaining pipes having to be placed inside (and perhaps these few would be stopped Bourdons), but it is none the less a 16′ organ. The same reasoning applies to small organs where even a complete 8′ open stop cannot be accommodated in the case front.

Mutation stops are so named because they do not ordinarily sound an octave to the foundation stops; examples are the Quint and the Tierce. All organ stops are distinguished as simple stops and compound stops. The simple stops consist of but one rank of pipes, which can be sounded alone. The compound stops (*Jeux composés*) necessarily consist of several ranks of pipes, ordinarily controlled by a register, and all the ranks together; these stops are the Fournitures, the Cymbales, and the Cornets. The Fourniture is alway composed of at least three or four ranks, and sometimes of even five, six, or seven (according to the size of the organ), but as a distinct stop running through the compass of the clavier. The Cornets are always composed of five ranks which speak together.

Organ stops are again distinguished from each other by being described as of small scale, medium scale, or large scale (*menue*, or *petite taille*; *moyenne taille*, or *grosse taille*); that is to say, the pipes of the various stops are not all of the same proportions. This applies to both open and closed pipes. The actual scale of the stops depends upon the dimensions of the church for which the organ is being constructed; and also according to the particular effect demanded from the instrument.[4]

It has already been remarked that the scale of the pipes varies according to the place they occupy in the scheme, the functions they have to perform, and the tonal effect one desires to produce. For example, the C of 4′ length, which belongs to the 16′ Open, and which corresponds to the "Middle C" key of the clavier, may have (let us say) a diamenter of 3 inches, but if it is the 4′ pipe of the Prestant it is given a different proportion, say, a diameter of 3½ inches. *All* organbuilders do not

[4] Here follows a long reference to the figures of the many various types of pipes, which without the plates can have no interest.

employ, or make use of, the same scales and proportions for the same stops. Some use larger scales than others. One may like a large scale for the upper part, another may prefer large-scaled basses. Therefore the reader should not depend upon the actual dimensions that I have given to the pipes represented, for one often finds different measurements. But they are the most usual, and do explain in general the differences between small, medium, and large scales.

We must now give a more detailed explanation of the several flue stops, such as are commonly to be found in French organs: the 32′ Open, the 32′ Bourdon, the 16′ Bourdon, the 8′ Open, the 8′ Bourdon, the Gros Nazard, the Prestant, the Grosse Tierce, the Nazard, the Doublette, the Quarte de Nazard, the Tierce, the Larigot, the Fourniture, the Cymbal, the Cornet, and the Basse de Viole. All the other flue stops found represented in an organ are but modifications of some of the above-mentioned, differentiated by other names according to their functions and the place they occupy in the scheme.

I should state and remark that when determining on the material—be it tin or lead—for the pipes to be made of, I but pretend to state what is common usage in France in this respect. Many use metal for the pipes of Bourdon trebles, the Cornet, Nazard, Quartes, Tierces, Larigots, and certain Pedal Flutes. I think with other able builders that this is not from a spirit of economy that they use lead for these stops, or that they would be better made and would give better and keener tone if they were made of pure tin. The feet of all interior pipes are made of metal (*étoffe*);[5] it would be better that they should be made of tin. It is not that this material would have any influence upon the tone of the pipes, but it would contribute much to their stability, their keeping in tune, and their original tone. All lead produces in the course of time a kind of rusty mildew, which alters the wind opening at the foot of the pipes. The result being, on account of the want of solidity in this material, that the pipes do not long remain in their exact original condition. We also find that in this country (France) it is necessary to have the organs tuned more frequently than in Germany, where lead is entirely banished from the organ, and where all the pipes and their feet are made of pure tin.

An open 32′ stop is of a medium scale, and the pipes are made of pure tin. It is also the deepest toned of all flute stops. It can be dispensed with from the manual clavier, should one desire, and be used as a Pedal stop, where it is most effective and useful. Used thus it does not need more than two or three octaves of pipes, instead of the whole compass of the clavier. This is known as the *Pédale de Flûte de* 32 *pied*. This stop can be made of wood if the pipes are not required to be placed *en montre*.

The 32′ Bourdon. The longest pipe is of 16′ length and stopped. The three lower octaves of the pipes are made of wood, and the remainder of metal. This stop should be of large scale. It does not always run the whole compass of the clavier for reasons already given.

The 16′ Open, which is generally placed in the case front if circumstances permit, is a stop of medium scale, which speaks an octave above the 32′ Open. This stop can be given the whole compass of the clavier without inconvenience, and it is made of pure tin. If some of the lower pipes are not *en montre* they can be made of wood. Occasionally some of the bass notes are made of stopped pipes, when the case is not large enough to accommodate open pipes. In large organs a 16′ Open stop is

[5] That is, "stuff" or material.

to be found in the Pedal department, where it is called *Pédale de Flûte de 16 pied.* This stop gives a fine effect.

The Bourdon of 16′ is a closed 8′ stop, and speaks in unison with the 16′ Open. The two lower octaves of pipes are made of wood, and the rest of metal. The stop should be of large scale as should all Bourdons, to create a satisfactory effect. If space permits it runs the whole extent of the clavier. In large organs one frequently meets with a 16′ Bourdon in the Positif Organ. It can also be placed in the Pedal Organ when space does not permit the introduction of a 16′ open stop. It would then be called *Pédale de Flûte de 16 pied.*

The 8′ Open is generally placed *en montre*; it is a stop of medium scale and sounds an octave above the 16′ Open. The pipes are made of tin and extend throughout the entire clavier compass. In organs having a 16′ *en montre* in the *buffet* an 8′ stop is used *en montre* in the Positif case. In smaller instruments only a part of the 8′ stop is used in the Positif front. The Positif 8′ should be of medium scale, and similar to that on the Great. In large organs one is not content with a single 8′ Open; two are often to be found. The second should be of a scale somewhat larger than the first, and to distinguish it from the other it is called *Flûte ouverte de 8 pied*, or second Open 8′. Also, another 8′ stop is sometimes added in the treble, and is of two octaves and a half only in extent. This is called *Flûte de 8 pied*, or *troisiéme 8 pied.*

The principal 8′ Pedal Flute (open) is of large scale, the lower 12 or 18 pipes being of wood, and the upper of metal. In large organs a second 8′ Open is found, and this stop is composed of tin pipes throughout. To distinguish these two stops the first is known as the *Premiére Pédale de Flûte de 8 pied*, and the other as the *Seconde Pédale de Flûte de 8 pied.*

The Gros Nazard. This is a Mutation stop, of large scale and with open pipes. Its longest pipe is 5 1/3′ in height. It is of complete compass. The few lowest pipes may be of wood, but all the rest are of metal. This stop is only placed in 16′ organs, and with more reason in larger instruments. Sometimes a Gros Nazard is to be found in the Pedal Organ, where it is called *Pédale de Gros Nazard*, but this stop is only found in very large instruments.

The Prestant is an open 4′ stop, of medium scale, and speaks an octave above the 8′ Open. It is made of pure tin and extends throughout the compass of the manual. A similar stop is placed in the Positif. There is always on the Pedal an open 4′ stop of large scale, which is made of metal; sometimes the lower pipes may be of wood. This is called the *Pédale de Flûte de 4 pied.* There is another stop which is often to be found in the Positif, which speaks in unison with the Prestant. It is closed 2′, or is stopped *à cheminée*, and all the pipes are of metal. It is simply called *Flute de 4 pied.* This stop is more necessary in the Positif than in the Great.

The Grosse Tierce is a Mutation stop of large scale and of open pipes, all of which are made of metal, and the stop extends through the whole compass of the clavier. It speaks a third above the Prestant. For this stop to be effective and of greatest use there should be present in the organ at least a Bourdon of 16′. It is not to be found in the Positif, but it is sometimes given a place in the Pedal department, in which case it is named *Pédale de Grosse Tierce.* The longest pipe is 3 1/5′ 2″.

The next installment will deal with the registration methods, i.e., the *mélanges* of stops used for different purposes.

LEONARD ELLINWOOD

THE MUSIC OF WASHINGTON CATHEDRAL

Perhaps better than anywhere else in America today, the musical life of Washington Cathedral continues the best of all the past traditions of cathedral music, whether Anglican or continental. Especially during the decade since the close of World War II Paul Callaway has been able to maintain a musical program on a well-nigh daily basis which draws an increasingly large body of musical pilgrims to Mount Saint Albans, where the lovely grounds and towering Gothic edifice look down on our nation's capital. This music program is not the result of sudden growth, rather it is the result of clear vision and careful planning, of which Mr. Callaway himself is but a part.

When, toward the end of the nineteenth century, Washington Cathedral was conceived, it was not thought of solely as a monumental building, but rather as a living institution which would reflect the best of all of the arts in the worship of our Lord and which, building on the traditions of English cathedrals of other generations, would give meaning on a larger scale to the full life of the Church in the modern age. This wide vision has led to the extensive educational program of the Cathedral, its experimental work in stained glass and sculpture, its constant stream of great preachers, and above all its steady witness in what has become a great world center, both politically and culturally.

Consequently, long before any portion of the Cathedral fabric was ready for use in public services, the second Bishop of Washington, the late Alfred Harding, interested Edgar Priest in building a cathedral choir. Mr. Priest had come to Saint Paul's Church, Washington, in 1901, after graduation from the Royal Manchester College of Music in his native England. Using boys and men who were currently singing in various local churches, he formed a nominal cathedral choir which sang Evensong each Sunday in Saint Albans Parish Church, adjacent to the cathedral close, beginning in 1904. Largely through the generosity of Mrs. Harriet Lane-Johnson, a choir school was endowed that same year and construction begun on the building which still bears her name. The choir school began its full-time schedule in 1909. Three years later, with the completion of Bethlehem Chapel in the growing Cathedral, the choir moved into its own stall and began the daily schedule of choral services which has continued ever since without a break. The choir has since moved twice, on Easter 1932 into temporary stalls in the east end of the Great Choir when that section of the Cathedral was opened up for services, finally in 1936 into its present location just east of the rood screen, when the crossing and parts of the transepts and nave were completed.

"Daddy" Priest, with his English background, laid an excellent foundation over the years, training successive groups of boys who often stayed on to sing with him as men, and planning the design and location of the Cathedral's organs. During the years when services were held solely in Bethlehem Chapel, the choir sat in stalls on both sides of the altar, the organ console was behind the decani singers, but the organ itself was in a spacious chamber at the very rear of the chapel. This wide spread of choir and organ in a low, stone-vaulted chapel presented a problem which

would easily have baffled a less competent musician. Its great resonance made possible subtle shadings of softer tones, a factor which was cultivated by the contrasting soft stops on the organ, but prohibited the use of many loud, sonorus works.

In 1935, only three years after the move upstairs into the Great Choir, Mr. Priest passed away after a sudden, brief illness. His work was taken over by a former pupil, Robert Barrow, who served for four years during which a fine new Skinner organ of 125 ranks was installed. Under his sensitive leadership the choir improved and achieved several peaks of artistic excellence. The acoustic properties of that portion of the building that was then completed tended to diffuse the sound of the choir, rather than concentrate it, which sometimes obscured the music and made it difficult for members of the choir to hear each other. It was apparent that the choir stalls were not the best point of origin for music in the building. It was often remarked that the sound of the choir was more concentrated and pleasing as they entered the north transept in recessional hymns, and especially when they descended the stairway to the crypt for a final amen. By experiment it was found that the gallery of the north transept was an ideal location for the choir, the wall behind them acting as a sounding board and projecting their tones with perfect clarity. Accordingly, at the close of Evensong one Sunday early in 1939 the choir proceeded from their usual places into the transept and up to the balcony, and there sang an a cappella program of English polyphonic music, mostly of the sixteenth century. Mr. Barrow sounded the pitch with a pitch pipe. For the first time the choir could really be heard. Their beautiful tone quality and the cohesiveness of their ensemble were heard to advantage, and the high level of their musical understanding was apparent. It was a memorable service.

Paul Callaway came to Washington in the Fall of 1939. With careful and patient skill he polished his choir and the music of the Cathedral services, at the same time playing frequent recitals which gave ample evidence of his skill at the console and of the caliber of his instrument. Perhaps the high point of his work with the Cathedral Choir during these prewar years was the performance on Good Friday, 1942, of the Bach Saint John Passion. It had been planned for Palm Sunday afternoon, but an unseasonable blizzard that morning had knocked out the power lines into the Cathedral Close so that the choir had to sing the services a cappella that day. This same winter and spring saw the organization and initial concert of the Cathedral Choral Society under Mr. Callaway's direction.

In June 1942, Selective Service brought a temporary halt to such activity on his part, although so well had he built during those three years that others were able to carry on for him during the war. Ellis C. Varley came down from Hartford to assume charge of the choir, and William Strickland, Conrad Bernier, and others took turns with the Choral Society. On March 20, 1946, Mr. Callaway returned to the Cathedral to pick up the reins he had dropped four years earlier.

During the decade since World War II, many aspects of the Cathedral music program have grown in intensity while others have sprouted and developed. As the edifice itself has grown, the choir has increased in size. Shortly after his return in 1946 the number of boys was increased from twenty to twenty-four, and then in 1950 to the present number of thirty. With this last increase, the number of men rose from twelve to twenty; a few of these are former choirboys, but the fact that most of the boys go away from Washington for their college careers keeps this number small. When he

first came to Washington, Mr. Callaway began a training or "junior" choir. Local boys were admitted to this from the third grade level as soon as they could read the words of the Psalms, and given one or two years of training, meeting for rehearsal and to sing Evensong each Monday and Friday afternoon during the academic year. Since the war, in the hands of the associate organist, the Junior Choir has increased in size and quality, and to the weekday appointments has been added an early Communion Service each Sunday. At the end of each season, competitions are held among these juniors for the vacant places in the Senior Choir. Junior choirboys are paid a modest fee for encouragement and to ensure regularity of attendance. Appointment to the Senior Choir carries with it a scholarship which covers the larger part of the tuition in Saint Albans School.

Mention was made earlier of the endowment of the choir school in 1904 by Mrs. Harriet Lane-Johnson. Within a few years, pressure from the community, coupled with a realization that a school of only twenty or thirty boys could not operate as efficiently as a larger group, led to the expansion of Saint Albans School to a combination day and boarding school where today the choirboys on scholarship are slightly less than ten percent of the total enrollment. In the lower forms they are in classes by themselves by grades, but in the upper form their schedule is planned so that they attend the regular classes. Courses are so arranged that they go to the choir room at 11:15 each morning, Monday through Friday, for an hour's rehearsal. After sports in the afternoon they return for a brief rehearsal followed by Evensong on Tuesday through Thursday. On Friday they return, after dinner at the school refectory, for the evening rehearsal with the men. Boys enter the choir at fourth or fifth grade level; most of them sing the treble part for five or six years after which they either continue as falsettists with the adult countertenors or as acolytes and librarians so that their scholarship continues through the twelfth grade and graduation from preparatory school.

Sensing the interest in organ recitals throughout the community, Mr. Callaway has maintained a constant series of recitals after Evensong on the first Sunday of each month. At first many of these were played by the Cathedral organists, but in recent years so great is the interest in playing these recitals on the part of visiting organists from all over the country that we seldom have opportunity to hear Mr. Callaway in recital. Since there is no budgetary provision for these recitals, the Cathedral is hesitant about asking organists to donate their services. Consequently organists wishing the prestige of a Cathedral recital must make the first approach to Mr. Callaway themselves.

At first the choir was presented in several special musical services each year. Since 1950, this too has become a monthly feature. On the last Sunday afternoon of each month, including the summer months when the men sing without the boys, a cantata or group of anthems takes the place of a sermon at Evensong. These are not exceptional occasions toward which the choir works to the detriment of the service music at other times; rather they are made of the same warp and woof as goes into the daily services which the boys sing. Herein perhaps is the magic touchstone which makes the work in Washington Cathedral so outstanding.

The mediaeval monks called it the "Opus Dei," the work for God. If you put the question to Mr. Callaway, you would get a whimsical smile and the briefest possible comment about the service of our Lord. Working under him, however, a

choirman soon senses the intensity of devotion which permits no compromise with the finest work possible at all times. He drives himself extremely hard (one recalls a scheduled performance of the Bach Clavierübung III which was played in spite of a bad case of bursitis) and drives his choir the same way. The rhythm of his rehearsals is very brisk; no moments are lost between stops and starts, one doesn't relax or light a cigarette between pieces; rather the work moves right on, the passage is repeated over and over until exactly right, all at an intense pace for approximately an hour, then a ten-minute break and work resumes for as many more hours as necessary for the coming services.

Each morning, including Sunday, the boys' voices are first warmed up with some simple vocalises. At full rehearsals, work begins with the hymns for the coming services. Many times all stanzas of each hymn are sung in their entirety, care being taken that all intervals are sung cleanly, all words articulated clearly. Much of this is done unaccompanied so that the intonation of the choir may be perfected and so that they do not lean on the accompaniment but rather sing independently, each member able to sing his part without depending on either his neighbor or the instrument for pitch. After perfecting the hymns and any short choral prayers to be taken from the Hymnal, the canticles and the Psalm to be chanted are rehearsed, again with the same attention to every little detail. Only then, perhaps after a full hour has passed, does the director move on to the anthems and other service music. Before each service this order is reversed with the sheet music rehearsed first in reverse order to its position in the service, so that the librarians can put it out in the stalls in ample time before the service begins. On Friday evenings, the one full rehearsal of the week, after the hymns and chants have been rehearsed, the choir moves from the choir room up to their stalls in the Great Choir for rehearsal of all anthems and service music *in situ*, exactly as they are to be performed at the next service. A familiar canticle may need only a single reading while as much as an hour may be spent on a tricky motet. So well has the choir been trained in recent years that much of that hour may pass with constant stopping, correcting, starting over again at various points in the motet, without the pitch being given save at the initial start. During this time the music for two or sometimes three services has been prepared, usually two canticles and an anthem for each service.

After all of the music is ready for performance, the boys are dismissed and the men resume work again in the choir room. At this time, the men read through and learn their parts to the music for a week in advance, occasionally spending some time on a difficult work coming some weeks ahead. The minimum rehearsal time averages about two hours on Friday nights, the maximum as much as three and a half hours, with two or three short breaks.

The repertory ranges from plainsong Psalms, hymns and canticles, through the fauxbourdon canticles, Tudor motets and masses, Purcell, Bach, S.S. Wesley, Stanford, Noble, and Vaughan-Williams to works by Sowerby, Searle Wright, and members of the Cathedral Choir and staff. This repertory is listed from time to time in the pages of The Ameircan Organist and The Diapason. Anyone interested in the repertory over a decade (1941-1951) will find such on pages 191-200 of the present writer's History of American Church Music (New York: Morehouse-Gorham Company, 1953). To participate in the performance of such a repertory is a real challenge to any competent musician. This, coupled with Mr. Callaway's ability to convey to his

choristers his own sense of dedication, accounts in part at least for his ability to attract and hold musicians at the Cathedral in spite of long rehearsal hours, double services on Sunday, and relatively low pay scales. Perhaps part of that sense of dedication comes from the habit of standing and saying together the collect "Direct us, O Lord, in all our doings . . ." (Book of Common Prayer, page 49) before, and the Gloria Patri at the end of *each* rehearsal.

Certainly there is a strong sense of dedication to the Opus Dei on the part of all who sing or play under Mr. Callaway's direction. It is found in the spirit with which they work during a grueling rehearsal, the spirit with which they rise to the occasion as especially significant services come up, or in the way they sing at times like Passion Sunday afternoon, 1956. It started to snow about midforenoon that day. Attendance at the morning service was not noticeably affected, but by midafternoon there was such a blizzard outside that only thirty-five persons came to Evensong, although all fifty members of the choir were present. They sang the full service as they would have had no one been present or had the Cathedral been packed to the doors; afterwards several of the choirmen remarked that it was one of the best services they had ever sung. They had truly sung "praises unto our God."

When he first came to Washington, Mr. Callaway arranged for the services of William Brackett, then organist-choirmaster of Saint John's Church, Georgetown, D.C., as a part-time assistant. In the spring of 1941, he was able to secure a full-time assistant in the person of Richard W. Dirksen who had just graduated from Peabody Conservatory. Mr. Dirksen is one of those people who are practically born inside an organ. He comes from Freeport, Illinois, where his mother has served many years as church organist, and his father as a distinguished organbuilder. A year ago the Cathedral obtained a one-manual, positiv organ from the Dirksen shop, especially designed for Bach and Mozart continuo accompaniments in the Cathedral. After only a year of service, Mr. Dirksen joined the United States Army, serving first as a post organist and later as a combat infantryman, seeing service over much of Europe. Since his return to the Cathedral, Mr. Dirksen has served as the associate rather than assistant organist-choirmaster, and as director of the glee clubs of Saint Albans School and the National Cathedral Girls' School, with which he presents an annual operetta and several secular-sacred concerts which rival those of the best school groups in the country.

This association with Mr. Callaway makes a remarkable team. Walking down the street, they differ greatly in stature. At the keyboard they are both giants. Neither one specializes in any particular phase of repertory more than the other. After a few months of working under Mr. Callaway, Mr. Dirksen became so adept that he could slip onto the bench in the midst of a service and the choir would hardly be conscious of the difference. Being younger and with a lively family of his own, Mr. Dirksen can play with the boys outside the Cathedral; inside he keeps track of discipline, payrolls, and music library. At the keyboard he is a truly gifted improviser, on paper he is one of the most talented of the younger church composers in America today. The only limitation is that he composes for the Cathedral Choir, with the result that most of his works are too difficult, too modern in style, for the majority of choirs, and consequently they have not been sought out for publication. Those who have been able to hear a telecast of the Cathedral's Easter services in the past few years have heard his exciting setting of the canticle Christ our Passover. During July

and August when the boys are on vacation, Mr. Dirksen maintains the Sunday services with a choir of twenty men.

One should mention the encouragement which many young church composers have received in recent years. In service or in special musical programs, Mr. Callaway does not hesitate to give significant new works the same careful preparation and performance which goes into a Bach or a Byrd number. On at least three occasions during the past decade the Cathedral has commissioned specific works from distinguished American composers.

There are now three groups in the city with which Mr. Callaway works and through which he brings the musical life of the Cathedral into the community on a non-sectarian palne: the Cathedral Choral Society, the Chamber Chorus of Washington, and the Opera Society of Washington.

The Cathedral Choral Society was organized in 1941 in order to provide a medium whereby the larger sacred choral literature could be performed with orchestral accompaniment in the Cathedral and elsewhere in the community. Its two hundred members come from all sections of the city and the surrounding counties in Maryland and Virginia, rehearsing for two hours each Monday evening; many are themselves competent choirmasters. Using members of the National Symphony Orchestra as accompanists, and drawing distinguished soloists from all parts of the country, it has given a number of first performances and sung much of the standard oratorio repertory in three concerts annually. The Bach B Minor Mass is a particular favorite which has been given biennially. In all of its performances, as in his work with the Cathedral Choir, Mr. Callaway has been meticulous in his exact readings of the full, unabridged form of each composition. For this society, Leo Sowerby has recently completed a new work, The Throne of God.

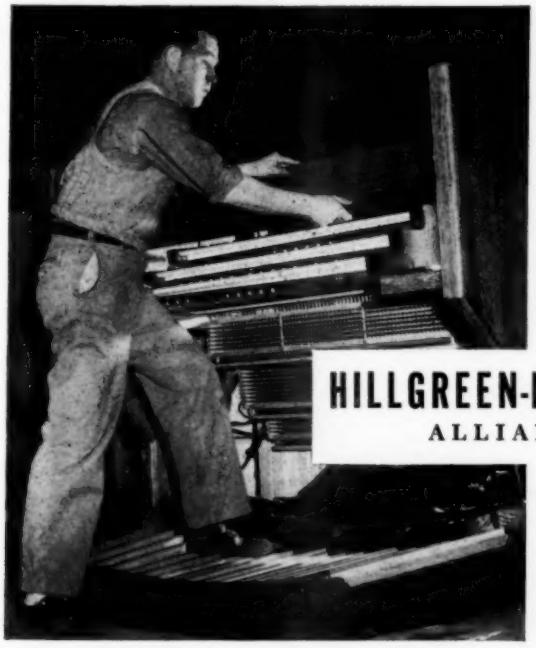
The Chamber Chorus of Washington was formed in 1948 as a chorus of twenty-five to thirty mixed voices to provide choral music for special programs under professional conditions. Its first appearances were at Dumbarton Oaks and the Phillips Gallery. It sang a program of Bach motets for the Cathedral's Bach Anniversary Festival in 1950, then recorded and performed the Byrd Great Service. Other unusual works which it has performed are masses of Monteverdi and Domenico Scarlatti as well as the latter's Stabat Mater. For the Coolidge Festival of 1956 it supplied the choral parts of Menotti's The Unicorn, the Gorgon and the Manticore.

Washington musical circles have felt the need in recent years for more opera than the few hackneyed works which an occasional touring company brings to the city. Three years ago, the National Symphony Orchestra devoted one of its pairs of seasonal concerts to a concert production of Mozart's Cosi Fan Tutte, directed by Mr. Callaway. The following year, Don Giovanni was sung in costume under his direction, using the Chamber Chorus and the correct proportion of the Symphony but still largely in concert style.

In September 1956 the Opera Society of Washington was founded with a distinguished and earnest list of sponsors to present artistic productions in English of a wide variety of outstanding operas, especially those less frequetly heard from travelling companies. As with the Choral Society, soloists are drawn from the best available in the country. During its first season it presented Mozart's Abduction from the Seraglio and Menotti's The Old Maid and the Thief with a second performance of his Unicorn, the Gorgon and the Manticore. For its next season, Mr. Callaway

plans to produce Beethoven's Fidelio, Richard Strauss' Ariadne auf Naxos, and another performance of Mozart's Cosi Fan Tutte.

Since the new bays in the nave of the Cathedral were opened up a year ago, the total seating capacity on the main floor is close to three thousand persons. Judicious use of flags and an occasional tapestry has cut down reverbertion to a remarkable degree. The Choir continues to sing from the stalls nearest the crossing, while the Choral Society sing from bleachers set up in the Crossing itself. The vaulting there is such that sound moves outward equally well into the four arms of the building. It is a live, vibrant place in which to sing, one in which the slightest pianissimo can be heard clearly and yet one in which all of the brass and percussion of Berlioz' Requim is not overpowering. Mr. Callaway, through the years, has learned how best to train his singers in their articulation and to time his attacks and releases so as to take full advantage of the Cathedral's acoustics. The result is a far more satisfying performance than in many modern auditoriums where there is little or no reverberation. This was well demonstrated in 1949 when the Cathedral Choir with members of the National Symphony Orchestra performed the Stravinsky Mass first in Constitution Hall and the following week in the Cathedral.



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16′ Sub Principal (tapered)	Zinc and Spotted metal, scale 34.
8′ Principal	Zinc and Spotted metal, scale 43.
8′ Diapason	Zinc and Spotted metal, scale 45.
8′ Gemshorn (tapered)	Zinc and Spotted metal, scale 46.
8′ Rohrbordun (compound scale)	capped Zinc and Tin, (Chimneys).
5 1/3′ Gross Quint (tapered)	Spotted metal, scale 50.
4′ Principal	Spotted metal, scale 54.
4′ Octave	Spotted metal, scale 56.
4′ Flute Couverte	capped spotted metal, compound scale.
2 2/3′ Octave Quint	Spotted metal, scale 66.
2′ Superoctave	Spotted metal, scale 69.
1 3/5′ Tierce	Spotted metal, scale 74.
IV Full Mixture (12-15-19-22)	Spotted metal, 44 scale at 8′ (halves on 19th).
IV Fourniture (15-19-22-26)	Spotted metal, 46 scale at 8′ (halves on 19th).
III Scharff (22-26-29)	Spotted metal, 48 scale at 8′ (halves on 19th).
8′ Bombarde (6″ pressure)	hooded reeds, harmonic.

Processional Organ. Enclosed. 3 1/2″ pressure. Plays from Great Manual.

8′ Salicional	Spotted metal, scale 64.
8′ Holzflöte	Stopped wood,
4′ Prestant	Stopped metal, scale 59.
2′ Doublette	Spotted metal, scale 70.

Positif Organ. Unenclosed. 2 1/2″ pressure.

8′ Lieblichgedeckt	Stopped wood and capped metal.
4′ Principal	Spotted metal. scale 57.
4′ Koppelflöte	Tin, Special compound scale.
2 2/3′ Nasard	Tin, Special compound scale.
2′ Blockflöte	Tin, Special compound scale.
1 3/5′ Tierce	Tin, Special compound scale.
1 1/3′ Larigot	Tin, Special compound scale.
IV Cymbel (26-29-33-36)	Spotted metal, scale 48 at 8′.

Swell Organ. Enclosed. 4 1/4″ pressure.

16′ Flute Conique (tapered)	Zinc and Spotted metal, scale 36.
8′ Geigen Diapason	Zinc and Spotted metal, scale 46.
8′ Viole de Gambe	Zinc and Spotted metal, scale 56.
8′ Viole Celeste	Zinc and Spotted metal, scale 56.
8′ Flute Conique	Extension of 16′.
8′ Flute Celeste (Tenor C)	metal, scale 48 at 8′.
8′ Gedeckt	Stopped wood.
4′ Octave Geigen	Stopped metal, scale 58.
4′ Fugara	Spotted metal, scale 65.
4′ Flute Octaviante	Spotted metal, Special compound scale.
2 2/3′ Nasard	Capped metal, Special compound scale.

2′	Flageolet	Spotted metal, scale 70.
1 3/5′	Tierce	Spotted metal, Special compound scale.
III	Mixture (15-19-22)	Spotted metal, scale 46 at 8′.
IV	Plein Jeu (19-22-26-29)	Spotted metal, scale 48 and 50 at 8′.
16′	Bombarde	Reeds.
8′	Trompette	Reeds.
8′	Hautbois	Reeds.
8′	Vox Humana	Reeds.
4′	Clairon	Reeds.
	Tremulant	

Choir Organ: Enclosed. 4″ pressure.

16′	Quintaton	Stopped wood and capped metal, scale 8′ C 55.
8′	Viola	Zinc and spotted metal, scale 54 C.
8′	Dulciana	Zinc and spotted metal, scale 5 C.
8′	Unda Maris (T.C.)	Spotted metal, scale 67 at 4′ C.
8′	Orchestral Flute	Open wood, harmonic open wood, and metal.
4′	Nachthorn	Spotted metal, scale 1′ C 75, 2′ C 69, bass-compound.
2′	Zauberflöte	capped, and harmonic capped metal.
16′	English Horn	12 capped reed basses, then inverted double bells.
8′	Trompette Harmonique	Reeds, French shallots. Scale 3 3/8″ C.
8′	Clarinet	Reeds and open metal. Scale 1 3/4″ C.
4′	Rohrschalmei	Reeds. 4′ C scale 1 3/8″.
8′	Bombarde (Great)	

Pedal Organ: 5″ pressure. Unenclosed, except for Swell and Choir borrows.

32′	Contrebasse	Open wood, with beards.
16′	Principal	Open zinc and spotted metal, scale 29 (11 3/4″).
16′	Contrebasse	Spotted metal. Extension of 32′.
16′	Quintaton (Choir)	
16′	Flute Conique (Swell)	
16′	Bourdon	Stopped wood.
10 2/3′	Gross Quint	Tapered Zinc and spotted metal, scale 43.
8′	Octave	Zinc and spotted metal, scale 42.
8′	Violoncello	Spotted metal. Extension of Contrebasse.
8′	Gedeckt (Swell)	
8′	Flute Ouverte	Open and triangular wood.
5 1/3′	Octave Quint	Tapered zinc and spotted metal, scale 49.
4′	Superoctave	Spotted metal, scale 56.
4′	Flute Harmonique	Zinc and harmonic spotted metal.
4′	Klein Gedeckt (Swell Extension)	
2′	Waldflöte	Open metal, scale 68.
III	Mixture	Spotted metal, 17-19-22, scale 62, 64, 66.
III	Fourniture	Spotted metal, 22-26-29, scaled on 44 at 8′.
16′	Bombarde	Zinc tubes. Reeds, scale 8″ at CC.
16′	English Horn (Choir)	
8′	Trumpet	Reeds, zinc and spotted metal, scale 3 5/8″ C.
4′	Clarion	Reeds, zinc and spotted metal, scale 2 5/8″ c.

Summary

	Stops	Pipes	Ranks
GREAT	16	1,467	24
SWELL	20	1,613	11
POS'F	8	671	11
CHOIR	12	767	4
PRO'L	4	244	19
PEDAL	22	632	
	82	5,403	93

Couplers:

Swell to Great 16', 8', 4'
Positif to Great 16', 8'
Choir to Great 16', 8', 4'
Swell to Choir 16', 8', 4'
Choir only on Manual I
Swell to Swell 16', Unison Off, 4'
Choir to Choir 16', Unison Off, 4'
Great to Pedal 8'
Positif to Pedal 8'
Swell to Pedal 8', 4'
Choir to Pedal 8', 4'

Combinations: adjustable and visibly moving drawknobs and tablets.

Great: 0-1-2-3-4-5-6-7-8. Duplicate toe studs. 1–3–6.
Swell: 0-1-2-3-4-5-6-7-8. Duplicate toe studs. 1–3–6.
Ch. Pos: 0-1-2-3-4-5-6-7-8. Duplicate toe studs. 1–3–6.
Pedal: 0-1-2-3-4-5-6-7-8. 1–8 duplicated.
General. 1-2-3-4-5-6-7-8 Cancel (2). 1–8 duplicated.

REVERSIBLES:

Full Organ: Manual piston and toe stud.
32' Contrebasse: Manual pistotn and toe stud.
Great to Pedal: Manual piston and toe stud.
Swell to Pedal: Manual piston and toe stud.
Choir to Pedal: Manual piston and toe stud.
Chorus Reeds Silent: Manual piston and toe stud.
Mixtures Silent: Manual piston and toe stud.
Swell to Great: Manual piston only.
Choir to Great: Manual piston only.
Manual 16's Silent: Manual piston only.
Positiv to Great: Toe Stud only.
On-or-off pistons: Pedal Combinations to Great Pistons (Double Touch).
Pedal Combinations to Swell Pistons (Double Touch).
Pedal Combinations to Choir Pistons (Double Touch).

CRESCENDO PEDALS:

I. Choir II. Swell III. Processional IV. Register

EDWARD B. GAMMONS

THE ORGAN IN SAINT JOHN'S CHAPEL GROTON CHAPEL

The instrument in the Groton School Chapel probably is as truly representative of the work of G. Donald Harrison as any other organ built by Aeolian-Skinner, and in many ways it shows his ideas and ideals in a very special manner.

This organ was the first in which Mr. Harrison's completely distinctive style came to the fore, and here, he built his first Positiv division. The writer was privileged to spend many happy hours with Mr. Harrison planning details of this organ, though at that time he was not the organist. Since 1941, many minor alterations have been made where Mr. Harrison and the author again worked together. The Groton organ probably demonstrates Mr. Harrison's conception of a true church organ in practice.

At Groton Mr. Harrison planned an organ based on the principles of the past, but with a mind fully open to the contributions and needs contemporary and individual, yet admirably adapted to the building and the uses of the school. Further, it affords every reasonable timbre and device required for the various schools of organ literature.

It is a source of pride to the school that this organ remained one of Mr. Harrison's favorites. In many letters he stated that though he might build larger, more brilliant or spectacular instruments, that in the Groton School chapel would always stand as one of the finest of his works and perhaps as the one most characteristic of his ideals.

It is difficult to compress a description of such a many-sided art work into a short article for the QUARTERLY, but I should like to take up each division briefly and comment upon its apportionment and any changes which have been made. At the outset one must say that the organ, for the most part, does stand in a chamber which is narrow and deep—not an ideal position for any organ.

The Pedal 32′ basses stand across the rear wall, and extend along the top of the chamber from back to front. The 16′ Pedal basses and those of the Great 16′ run along one wall, while the expression chambers are built in two stories with the Swell above and the Choir below. On the upper level, in front of the Swell, stands the pipework of the Great, on two chests. Below, and in front of the choir box stands the upperwork of the pedal, and the hooded Great Bombarde.

Towards the chancel, and partly projecting out into it stands the Positif, in the little gallery that formerly contained the console.

The handsome organ case, from the Hutchings organ of 1900, contains the basses of the 8′ Principals of the Great and Pedal. All in all, the disposition of the organ is a masterly use of a very difficult area, and the blend and balance of the divisions are unusually fine.

When the organ was installed in 1935, the console was placed in a little chamber, off the chancel, behind the cantori stalls. From this position it was impossible to judge the balance between choir, organ, and congregation, and the organist was at a severe disadvantage.

Fortunately, the Groton headmaster and trustees were very understanding, and in 1948 the console was placed on the nave floor in an ideal spot for hearing the organ itself, and in relation to its function.

The little console room did not stand idle for long, for in 1954 it was converted into an expressive "Processional Organ," which gives fine support to the choir in the chancel, and also sounds into the area where the choir starts its processions and finishes the service.

The Great organ is the foundation and indeed the glory of the instrument. It has a complete chorus of Principals, 16′, 8′, and 4′, ending in Full Mixture 12-15-19-22. Then there is a secondary chorus made up of the 8′ Diapason, 4′ Octave, 2 2/3′ Quint and 2′ Superoctave. These choruses supplement each other and may be used in countless ways. Then one may add the IV Fourniture and the III Scharff to either grouping with excellent results, as may fit the texture and dynamics of the music being played. Further mutation possibilities are brought by the 5 1/3′ Gross Quint, and the 1 3/5′ Tierce, which may be added to any of the mixtures or foundation groups.

A third group of voices, the 8′ Gemshorn, 8′ Rohrbordun, and 4′ Flute Couverte give opportunities for flute combinations and quiet interesting solo or accompanimental uses. The 4′ Flute replaced a 3 1/5′ Gross Tierce in 1944, and the Rohrbordun was revised from a Positiv stop in 1954, when it displaced an 8′ Flute Harmonique.

The 8′ Bombarde is listed with Great registers, as it stands unenclosed, and is a commanding voice, but it is not intended to dominate the entire flue chorus. When the organ was built in 1935 Mr. Harrison justly recognized that the whole "flue chorus" represented the essence of the organ. This fact still stands. But it was felt that in such a complete instrument there was a proper place for a clear and brilliant unenclosed reed voice to act as a foil to the swell reeds, and to provide a special climax for certain schools of organ music, and to lead the singing of hearty congregational hymns. This 8′ Bombarde is of moderate scale on 6-inch pressure and uses harmonic trebles. The stop is the gift of Dr. and Mrs. William H. Barnes, and is duplexed to the Choir so that it may be used against the Great, and on rare occasions subject to octave coupling. This Great is one of real versatility and rich brilliant sonority. It is well-nigh perfect in its own right, but I dare say, now, that Mr. Harrison and I hoped that some day there would be a flue counterpart to the Bombarde in the nature of a VI Grand Plein Jeu.

The Positif organ, in the projecting gallery, presents one of the rare features of the installation, The pipe formations are not, as was stated in an earlier edition of the QUARTERLY, adaptations of the type of mutations employed by our esteemed English confrere Mr. Henry Willis, nor are these stops smaller in scale than those at the Advent in Boston, as Mr. Phelps supposed. The stops of the Groton Positif are based on those represented in Praetorius, 1609 Syntagma Musicum. The 4′ Koppelflöte was the first true stop of that formation made in America and the low pressure of 2½″ was the first successful proof that the pitman chest would operate well on such pressure.

Musically the division is a constant delight in every way; and after using a Positif section for twenty years the writer feels that one properly located and voiced does almost more than any other factor in making the seventeenth- and eighteenth-century music vital to the listener.

It might be pointed out that in 1950 Mr. Harrison and I made an exchange in the Great and Positif mixtures. The Great Cymbel was revised to a IV stop and placed on the Positif as the highest pitched mixture in the organ, and the former Positif Scharf recast as the third mixture on the Great. In 1950 and 1954 further regulation was done and the Positif 1′ Sifflöte converted into a 1 1/3′ Larigot.

The Swell organ suffers very slightly from a deep position, and in 1950 the pressure was raised a small amount to secure a more proximate effect. At the same time the chorus reeds were revoiced, and it might be said that in 1954 the Hautbois replaced a second Trompette. Originally this division had one large VI Plein Jeu, which brought in intervals of the 16′ series. Mr. Harrison and I came to feel this a mistake, and in 1954 we revised the stop to give a III Mixture (15-19-22) and a IV Plein Jeu (19-22-26-29). The far greater utility of the two registers has shown the wisdom of this change. In 1954 certain interesting changes were made and I think the reasons will be apparent as they are listed.

The 16′ Flûte Conique was placed on magnets and an 8′ Flûte derived from it. The 4′ Flûte Triangulaire was replaced by the former Great Flûte Harmonique (transposed to 4′ pitch) and this Flûte Octaviante gives better blend with flue and reed voices, yet contrasts better with the wood Gedeckt. An 8′ Flute Celeste was added, and the 8′ Echo string stop removed to the Processional Organ as an 8′ Salicional.

The stop list of the Swell speaks for itself. There is an all-purpose flue chorus of Geigens 8′, 4′ through two mixtures, French type strings at 8′ and 4′, and flutes 16′, 8′, 4′, and 2′, plus a capped "color" Nasard, and light Tierce to give an enclosed Cornet in contrast to the open one of the Positif. There are two celestes to augment the colors in the flue family. The Bombarde 16′, 8′ Trompette, and 4′ Clarion present a real reed chorus of the kind the names suggest, and the Hautbois and Vox Humana add two other useful members of that class.

Like the Swell, the Choir organ is rather buired, hence the pressure here was raised a quarter of an inch in 1948. The section gives a very good account of itself and, like the others, it has been subject to little changes during my tenure at Groton.

The 16′ Quintaton is of metal to C, but unfortunately the bass is of stopped wood, and lacks the characteristic color. Some day this may changed, but the stop is nevertheless very useful as it is.

The 8′ Viola supplies a warm foundation register, and in 1950 it was improved by revoicing. The 8′ Dulciana and Unda Maris are very delicate stops, but of medium (54) scale so that they have a calm fullsome "bloom" which is most desirable as a *pp* tone.

"Orchestral" is a word in disfavor among the organ brethren today, but this 8′ Flute of open and harmonic wood pipes never fails to draw favorable comment. Perhaps the little inset metal upper lip gives just a special clear accent to the notes in the treble, but the voice is excellent in solo or combination.

In 1954 we removed the pleasant 4′ Lieblichflöte, and revoiced it as the foundation of the Positif, where it replaced the somewhat overlarge beautiful 8′ Rohrflöte now

on the Great. To fill the vacancy in the Choir a specially scaled 4′ Nachthorn was employed, and it seems most versatile with strings, flutes, and reeds.

The little 2′ Zauberflöte is what its name sets forth. Of harmonic capped pipes, it sends a piquant little sparkle into every combination it joins and and with the octave coupler it does well to make up for the loss of the Positif Sifflöte.

In this Choir organ, the reed grouping is of unusual interest, for many intriguing and musically valid combinations appear. The double is a 16′ English Horn, of true timbre and formation to tenor G, and then it merges into a fine Bassoon bass. The little 8′ Trompette Harmonique brings thoughts of Sainte Clothilde to the minds of all who have heard the Cavaillé-Coll in that Franckian fane. While some of our profession deem the common Clarinet a stop only for "tired business men," I venture to believe that this one has many really important musical values.

Added in 1954, the 4′ Rohrschalmei brings one true Baroque reed timbre into the family, and a most important addition. It associates well with the 16′ and 8′ voices and serves well in countless ways.

A Pedal organ of twenty-two voices ought to provide about everything we organists can demand, and this one does indeed. The full length open 32′ yields a wonderful clear tone, with a trace of string right down to CCC. Like the manuals, the Pedal here has a metal flue chorus as complete as one could wish. We find Principal tone in the independent ranks as 16, 10 2/3, 8′, 5 1/3′, 4′, and into compound mutations carrying the pitches from 3 1/5′ to 1′. Whether one looks for an independent pedal line, or appropriate bass of any timbre, one may find it. There are Flues at 16′, 8′, 4′, and 2′, all with separate pipes, and borrowed enclosed registers 16′, 8′, and 4′ in the flue family, and a jewel in the 16′ Choir English Horn borrow. One finds Pedal material in both boxes, and the whole is crowned by a magnificent family of three independent chorus reeds.

This entire instrument is predicated on the demands of the literature of the organ and its use in the worship services of the Church. In it Mr. Harrison used mild wind pressures, the finest of pipe materials, and no item was too small to merit his personal attention. The Groton organ grew with him in his wise judgment and devotion to musical and artistic perception. It is my deepest desire to keep this organ as a worthy memorial to a dear friend and one whom I believe to rank as the greatest builder of our century.

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ALEXANDER SCHREINER

THE TABERNACLE ORGAN IN SALT LAKE CITY

Just as the resonator of any musical instrument affects its tone, so also the building in which an organ is installed can act as a kind of resonator and create either an effective, cohesive blending of tone, or dull disjunct sound. The Mormon Tabernacle Organ occupies a commanding position in a building with fine acoustical qualities, a building erected by early settlers in a western wilderness.

The early Mormon pioneers reached the valley of the Great Salt Lake (Mexican Territory) on Saturday, July 24, 1847. Temporary meeting places were first built, and these were followed by the present Tabernacle which was begun in 1863 and finished in August 1867. The Tabernacle is one of the largest auditoriums in the world, seating eight thousand people.

The first organ in the Tabernacle was used at the dedication service in 1867. It was built and assembled with parts procured from the Simmons Organ Company in Boston by Joseph H. Ridges. Ridges joined the faith in Australia and came to Utah to live. This first instrument was enlarged in 1885, and completely rebuilt by W. W. Kimball in 1900, by Austin in 1916, and most recently by Aeolian-Skinner in 1948. No doubt each of these instruments could have served several times as long as it did, but the demands for recitals in the large building and the desire to keep the instrument abreast of the times caused the Church people to undertake the various renovations. The organ has been heard every week for nearly thirty years over radio networks, and in daily recitals for more than fifty years.

The new Aeolian-Skinner organ in the Tabernacle is a gem of the organbuilder's art. The general tonal scheme is in the classic tradition whereby each manual is an independent ensemble of contrasting tone and texture, complete with flue structure and chorus reeds as well as orchestral voices.

There are eight divisions, one of which is the Antiphonal at the rear of the Tabernacle. The other seven divisions comprise the main body of the organ, which is located in such a prominent position at the front as to enable the pipes to speak unimpeded, so that each section contributes its proportion to the total of the ensemble. For instance, the Positiv on the lowest wind pressure can be heard contributing its particular brilliance to the sum of the other six divisions. Also, the two most powerful stops, the Solo Tuba on fifteen inches and the Bombarde Trompette on seven inches, are not overpowerinng when heard alone and thus do not overshadow the remainder of the organ. This is a very delicate artistic achievement which can only be effected by the most experienced builders. It has been accomplished and is clearly demonstrable in this instrument. Two results are produced: (1) The whole organ sounds like a large choir of sounds, each stop contributing to the whole, a quality particularly sought in any musical ensemble whether it be choral, orchestral, or organ; (2) No one stop, though it be of dominating quality, is allowed to blot out whole sections of weaker voices, so that when the last Tuba is added, the sound is still that of a large organ and not that of one stop accompanied by all the rest. Naturally, there are delicate flue and reed stops which cannot be heard in a full ensemble, but the foundation stops, mixtures, and reeds, which are the backbone of the organ, are so well balanced that each contributes to a "democratic" ensemble of sound.

The Great Organ comprises a flue chorus extending from the 16′ Sub Principal to the Acuta, the mutations and mixtures supplementing the 16′, 8′, and 4′ series. The mixtures add not only brilliance to the ensemble but also a texture of fullness, avoiding the "scream" sometimes associated with sounds of high frequencey. There are no reeds on the Great, there being 31 ranks of reeds located in the other divisions.

The Bombarde is a super Great Organ, more rarely used and of heoric proportions. Its sixteen ranks together are nearly as powerful as the remaining 172 other ranks of the organ.

The Swell Organ contains both broad and keen strings, covered and open flutes, a Plein Jeu capable of being played by itself with musically satisfying results, and reeds at five pitches.

The Choir Organ has both broad and keen strings. The Zauberflöte is a set of closed harmonic pipes overblowing at the third harmonic. For example, a pipe three feet long produces a middle C sound. The reeds of the Choir Organ represent the Baroque family of short-length reeds at 16′, 8′ and 4′ pitches, and in addition there are the standard Trompette and Orchestral Oboe.

The Positiv Organ consists of clearly voiced flutes, mixtures, Principals 4′ and 2′, and the 16′ Ranckett of Baroque quality. Its nineteen ranks comprsie fourteen pitches.

The Solo Division, fairly standard, includes again strings both broad and keen, solo reeds on ten inches, and a Tuba on fifteen inches. The Tuba is not affected by the tremolo.

The Pedal Organ consists of thirty-six straight sets of pipes comprising sixteen pitches from the bottom 32′ to the top of the Cymbale – 32′, 16′, 10 2/3′, 8′, 6 2/5′, 5 1/3′, 4 4/7′, 4′, 3 5/9′, 3 1/5′, 2 2/3′, 2′, 1 1/3′, 1′, 3 2/3′, 1/2′. The seventh, tierces, and ninth included are contained in the five-rank Harmonic Mixture of the 32′ harmonic series. The Ophicleide is the dominating reed in the Pedal and sounds clear trombone quality to its lowest note.

The Antiphonal Organ contains a complete Diapason chorus together with a Trompette and a pair of strings. It speaks up without hesitancy against the main organ in antiphonal improvisations.

The main seven divisions are placed in front of the church walls without any recessing. Sixty percent of the pipe work is unenclosed. The boxes for the enclosed divisions are not deep. The Swell Organ, for example, instead of being buried in a deeply recessed chamber has its thirty-nine ranks distributed in four shallow rooms, behind four complete sets of high and broad swell shades. In addition, the ceilings of all swell boxes rise considerably from back to front to aid the emission of sound.

The present (1957) specification is as follows:

Great Organ (unenclosed, second manual)

16′ Sub Principal
16′ Quintaten
8′ Principal
8′ Diapason
8′ Spitzflöte
8′ Bourdon
8′ Flute Harmonique
8′ Bell Gamba
5 1/3′ Grosse Quinte
4′ Principal
4′ Octave
4′ Gemshorn
4′ Koppelflöte
3 1/5′ Gross Tierce
2 2/3′ Quinte
2′ Super Octave
2′ Blockflöte
1 3/5′ Tierce
1 1/7′ Septieme
2 2/3′ Full Mixture — IV
2′ Fourniture — IV
1 1/3′ Kleine Mixtur—IV
1′ Acuta — III
Chimes (P-F) 32 Tubes
(Dampers on off)

Choir Organ (enclosed, first manual)

16′ Gamba
8′ Principal
8′ Viola
8′ Viola Celeste
8′ Dulcet—II
8′ Kleine Erzähler—II
8′ Concert Flute
4′ Prestant
4′ Gambette
4′ Zauberflöte
2′ Piccolo Harmonique
2 2/3′ Carillon—III
2′ Rauschpfeife—III
16′ Dulzian
8′ Orchestral Oboe
8′ Cromorne
4′ Rohr Schalmei
8′ Trompette
8′ Harp
4′ Celesta (Dampers on and off)
Choir to Choir 4′ (on selected Choir to Choir 16′ stops.)

Swell Organ (enclosed, third manual)

16′ Gemshorn
16′ Lieblich Gedeckt
8′ Geigen Prinzipal
8′ Claribel Flute
8′ Gedeckt
8′ Viole de Gambe
8′ Viole Celeste
8′ Orchestral Strings—II
8′ Salicional
8′ Voix Celeste
8′ Flauto Dolce
8′ Flute Celeste (T.C.)
4′ Prestant
4′ Fugara
4′ Flauto Traverso
2 2/3′ Nazard
2′ Octavin
2 2/3′ Cornet—III
2 2/3′ Plein Jeu—VI
2/3′ Cymbale—VI
8′ Hautbois
8′ Voix Humaine
8′ Harmonic Trumpet
32′ Contra Fagot
16′ Contra Trompette
8′ Trompette
5 1/3′ Quinte Trompette
4′ Clariron
Swell to Swell 4′

Positiv Organ (unenclosed, first manual)

8′ Cor de Nuit
8′ Quintade
4′ Principal
4′ Nachthorn
2 2/3′ Nazard
2′ Principal
2′ Spillflöte
1 3/5′ Tierce
1 1/3′ Larigot
1′ Sifflöte
1 1/7′ Septerz—II
1′ Scharf—III
1/2′ Zimbel—III
16′ Rankett

Solo Organ (enclosed, fourth manual)

8′ Gamba
8′ Gamba Celeste
8′ Viole Celeste—II
8′ Flauto Mirabilis
4′ Concert Flute
8′ French Horn
8′ English Horn
8′ Corno di Bassetto
8′ Tuba
Chimes
8′ Harp
4′ Celesta
Solo to Solo 4′
Solo to Solo 16′

Bombarde Organ (unenclosed, fourth manual)

8′ Diapason
4′ Octave
2 2/3′ Gross Cornet —IV-VI
2 2/3′ Grande Fourniture —VI
16′ Bombarde
8′ Trompette
4′ Clairon

Antiphonal Organ (enclosed, fifth manual)

(enclosed, fifth manual)
8′ Diapason
8′ Gedeckt
8′ Salicional
8′ Voix Celeste
4′ Principal
2′ Kleine Mixtur—III
8′ Trompette
8′ Vox Humana
Antiphonal to Antiphonal 4′

Pedal Organ (unenclosed)

32′ Flute Ouverte
32′ Montre
32′ Bourdon
16′ Flute
16′ Principal
16′ Contre Basse
16′ Violone
16′ Bourdon
16′ Gemshorn (Swell)
16′ Gamba (Choir)
16′ Lieblich Gedeckt (Swell)
10 2/3′ Grosse Quinte
8′ Principal
8′ Violoncello
8′ Spitzprinzipal
8′ Flute Ouverte
8′ Flauto Dolce
8′ Gamba (Choir)
8′ Lieblich Gedeckt (Swell)
5 1/3′ Quinte
4′ Choral Bass
4′ Nachthorn
4′ Gamba (Choir)
4′ Lieblich Gedeckt (Swell)
2′ Blockflöte
10 2/3′ Grand Harmonics —V
5 1/3′ Full Mixtur—IV
1 1/3′ Cymbale—IV
32′ Bombarde
32′ Contra Fagot (Swell)
16′ Ophicleide
16′ Trombone
16′ Fagot (Swell)
16′ Dulzian (Choir)
8′ Posaune
8′ Trumpet
8′ Cromorne (Choir)
4′ Clairon
4′ Chalumeau
2′ Kornett
Chimes

At the time plans were being made for the renovation of the organ, the writer remembered some experiences in playing organs in cities of relatively high elevation where he noticed that certain flue work was on the verge of overblowing. Being somewhat of a physicist, he felt that it was reasonable to assume that, when a pipe is voiced at sea level and is later installed and played at 5,000 feet elevation where the atmospheric pressure is much rarer, the lighter column of air in the pipe would then be activated more violently than was intended. He found that the atmospheric pressure at the Aeolian-Skinner factory in Boston was 29.82 inches of mercury (29.92 at sea level) where the level was 100 feet, and that Salt Lake City, with an elevation of 4300 feet, has a normal barometric pressure of 25.7 inches of mercury He theorized that the relation between the voicing pressure and playing pressure should be the same as the proportion between atmospheric pressures, that is:

$$\frac{\text{25.7 inches barometric pressure}}{\text{29.8 inches baromentric pressure}} \text{ equals } \frac{5}{5.8} \frac{\text{inches of wind pressure}}{\text{inches of wind pressure}}$$

In view of this situation he recommended to the organ company that pipes intended to be played at 5 inches be voiced at 5.8 inches. At this time the pipes for the Antiphonal Organ had already been voiced on 5 inches, and when they were installed we found out that their speech was best on a reduced pressure of about 4 1/2 inches. With this experience in mind, the remaining pipe work was then voiced according to the above proportion.

The details of pipe work may be written down on paper very much like a composer writes down the notes of his music.

The cold measurements of pipework, however, like the printed notes of musical compositions, are only a part of the artistic product. They have to be brought to life by skilled pipe-makers and voicers, who are wisely encouraged to pursue their best taste and skill. This pipework makes wonderful, musical sounds. It all "comes off." Every stop furnishes in sound what is expected of it when seen on paper. Nothing sounds buried behind something else. Everything adds up. Any one stop, within quite liberal limits, will go interestingly with any other on the same manual. The reeds stay wonderfully in tune, and why? The dust in the air settles either in the bottom of the

crook, or stays on the outside of the pipe, on top of the hood. Rain may drop into a "rain-catcher" Tuba in a band, but not into the instrument of the trumpeter. Hooded pipes keep reeds in better order. They also, incidentally, cost more!

At the request of the writer, a special tablet with the signature of G. Donald Harrison was attached to the console. This organ, opus 1075 of the Aeolian-Skinner Organ Company, is the first of a proud number of organs which were "signed" by that great modern artist of organbuilding.

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VARIABLE-SPEED FAN BLOWING

When the delivery of a fluid is required in varying quantities, the logical thing to do is to vary the speed of the pump which supplies it. This has always been done when organs are blown by means of feeders. The rising top of the reservoir either closes the admission valve to a fluid-pressure driving motor, or inserts resistance into the circuit of a series-wound electric motor. In each case, the speed of the feeder is kept down to that which just delivers the wind being used, plus the leakage, and no more.

Since a fan with a blocked outlet will only churn the air and deliver none, it became the simple practice with fan blowing merely to close a valve at the entrance to the reservoir by the rising top of the latter, allowing the fan motor to continue running at full speed. This has some disadvantages, apart from the unnecessary consumption of power. A widely used form of valve for shutting off the supply is the roller pallet, and contrary to theory and what is generally supposed, this is not a perfectly balanced valve. In other words, it has to be opened to some extent against whatever pressure is acting upon it. Any power required to open it is deducted from the effective weight of the reservoir, hence will cause a drop in the wind pressure therein.

Now a fan will not maintain constant pressure at all rates of delivery, and a fan capable of delivering the maximum required quantity of wind against the required working pressure will in fact create a much greater pressure if its outlet is blocked. Thus when the roller pallet closes, the pressure against which it has to be opened will rise, even if the motor and fan speed remain constant. If the motor is not compounded for constant speed, its speed will rise when some load is removed by the closure of the roller pallet, and this will make matters worse by creating a still higher pressure.

It was with a view to avoiding this disadvantage that the writer made the apparatus about to be described, so that a fan delivered to the chamber organ described in The Organ (London) for July 1948 just as much wind as was being used from time to time. The fan is capable of delivering 350 cubic feet of air per minute against 4″ wind gauge when running at 1800 r.p.m. and consuming 1/2 horse power. At this speed it would build up a pressure of nearly 6″ wind gauge if its outlet were blocked, but actually the pressure rose to 8″ owing to increase of the motor speed. The motor is shunt-wound for 50 volts from a private generating plant, and at full fan output consumes 500 watts. This consumption falls to 300 watts with the fan outlet blocked. The reservoir pressure for the organ is 3″.

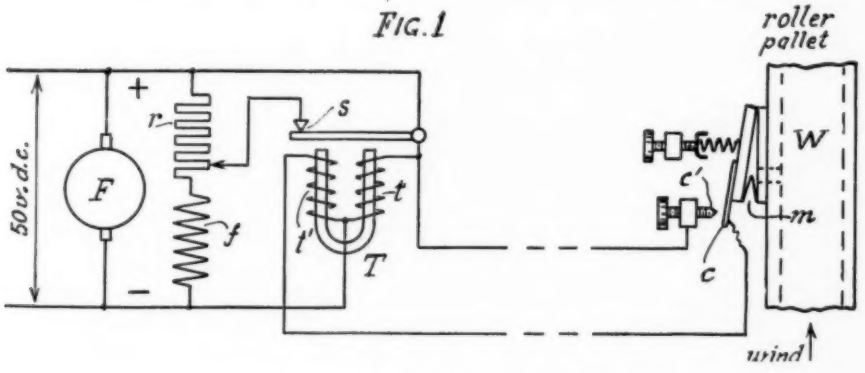
To find out the conditions which had to be fulfilled, the following procedure was adopted. The fan was run at full speed with the reservoir open, thus delivering to atmosphere, the only pressure against it being that necessary to overcome the friction of the wind trunk and fully open pallet. Under these conditions, the quantity of air delivered would be more than that delivered against reservoir pressure, but it was not necessary to measure the amount. A pressure gauge was connected to the wind trunk close to the inlet of the pallet, where the pressure was found to be 3/8″. It was clear, therefore, that if this pressure would deliver into the reservoir more

air than was required, it was necessary for the pressure at this point never to exceed this amount above reservoir pressure. To be on the safe side, however, it was decided to regulate the pressure at this point to 3 1/2" wind gauge, a pressure on the pallet of 1/2" above that on the other side of it not being too great to be objectionable. Next, the field strength of the fan motor was increased to reduce the speed sufficiently for the fan just to create this pressure with a blocked outlet. If, then, the outlet were opened to any extent, that pressure would drop. Running at this reduced speed, the motor consumed 200 watts, which showed a 33 1/3 percent saving of current on the consumption when running at full speed with no air delivered. It was found that the field coils were not overloaded if connected in parallel. This doubled the ampere-turns, which was more than enough. A resistance equal to the combined parallel coils, i.e., half the resistance of one coil, was then connected in the field circuit to bring the field current down to the original value for full speed.

This is shown in Fig. 1, where to simplify the diagram all the automatic remote-control starting gear for the fan motor is omitted, as it is not relevant to the present matter. A resistance *r* is provided in the circuit of the shunt field winding *f* of the fan motor F, the adjustment being such that the fan motor runs at full speed for maximum output. The resistance is normally short-circuited at *s* by contacts on the armature of a Tirrill relay T. The magnet of this relay is provided with two windings in opposition, the winding *t* being permanently connected across the lines and therefore continually excited so long as the motor is running. When the motor is switched on, therefore, armature of relay T is attracted and contact *s* opened, thus putting the resistance *r* into the field circuit.

Communicating with the main wind trunk W close to the inlet of the roller pallet is a small pneumatic motor *m* having an adjustable spring loading. The moving board of this motor carries an electric contact c which will engage a stationary contact *c'* when the motor is inflated. Closing of these contacts completes a circuit for the opposing winding *t'* of relay T. When this happens, the relay releases. The reason for releasing the relay T by means of an opposing winding is so that the contacts *c c'* only open on a non-inductive circuit, thereby avoiding the destructive sparking which would occur if they were operated the other way round, i.e. by opening the circuit of a single winding on the relay. The pneumatic motor *m* is adjusted so that its contacts close at the desired wind pressure which is to be regulated. The spring is adjusted so that a greater pressure than this is required to open the motor fully,

FIG. 1



but to be not strong enough to prevent the motor opening with a lower pressure than this. The motor will then remain balanced at some intermediate position when the desired pressure is attained. The contact *c'* is adjusted so that closing takes place at this position.

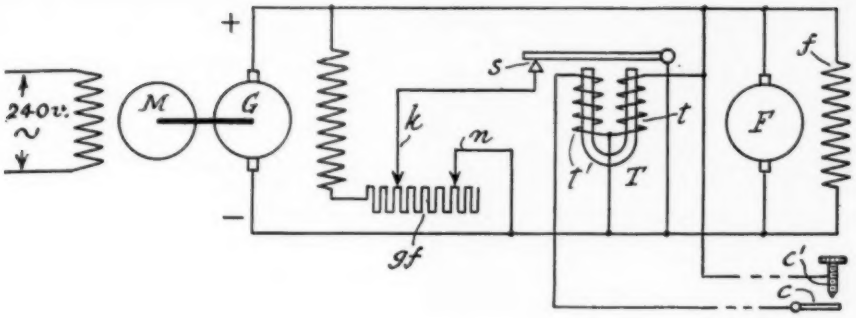
When the fan motor is switched on, relay T operates and opens contact *s*, the fan then runs up to full speed until the reservoir is full, when the closing of the roller pallet causes pressure in W to rise and close contacts *c c'*. Relay T then releases, closes contacts *s*, and short-circuits the field resistance *r*. The fan speed then falls. By placing a pressure gauge on the trunk W and watching the above performance, the stationary contact *c'* can be adjusted to the contacting position when the pressure is right. It has been said above that the field *f* is stronger than will allow the motor F to maintain the required pressure. The latter, therefore, in due course will fall too low and the contacts *c c'* will open. This puts back the resistance *r* and the speed rises. This process continues, the relay T and contacts *c c'* continually vibrating so as to maintain just that speed which will hold the pressure.

As soon as wind is taken for the organ, the reservoir drops and opens the roller pallet. This immediately causes the pressure in W to drop, so that the fan is speeded up as before. The relative lengths of time which the contacts *s* remain closed and open determines the speed of the fan motor, which will thus at all times be fast enough to deliver just as much wind as is being used and no more.

The connection between the contact *s* and the resistance *r* is shown adjustable, so that the amount short-circuited is reduced at the same time that a small amount left in the field circuit is increased. If this adjustment is made when no wind is being used, a point will be reached when the speed will just maintain the pressure without the necessity for operating the regulator, shown when the latter stops vibrating. The speed then will just supply the leakage, and will increase as before by the operation of the regulator as soon as the organ is played.

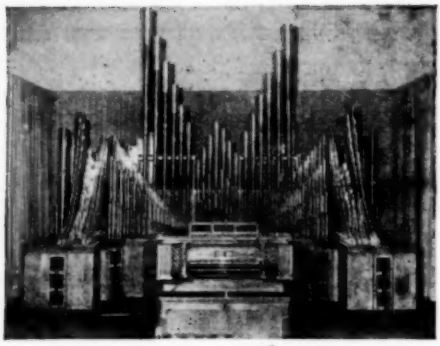
The time came when the supply was changed over to the public mains. A fan motor supplied from the mains could not be started with the existing automatic gear (not shown here), could not be regulated in speed in the same manner (and normally not at all), and would have been of a different speed from the existing motor, thus requiring a different fan. In short, the whole existing installation would have had to be scrapped. A far cheaper and simpler proposition was to install a motor generator to supply the existing motor. By rearranging the regulator to work on the field of the generator instead of that of the fan motor, the latter was given its variable speed by supplying it with a variable voltage. This resulted in a further economy of current consumption by the fan motor when running at minimum speed, largely due to the elimination of the loss in its field resistance. The new arrangement, as now operating, is shown in Fig. 2, also omitting the starter for the a. c. motor. Since the regulator now operates on the field of a generator, whereby the field resistance acts to reduce the voltage, reducing the fan speed, the contacts *s* of the Tirrill relay T must now operate the other way round, i.e. the contacts close when the relay attracts its armature. The mains supply a squirrel-cage motor M which on the same shaft drives the d.c. shunt-wound generator G, which is provided with a resistance *gf* in its field circuit. The whole of this resistance is of such value that the output of the generator will be insufficient to drive the fan motor at minimum speed to hold the pressure. It has an adjustable connection *n* to the negative main. There is also

FIG. 2



an adjustable connection *k* to the relay contact *s*. It is that part of the resistance between these two connections which is short-circuited by the contacts *s* when relay T is energized. When the generator is supplying current to the fan motor F, winding *t* of relay T will be energized and contacts *s* closed. The full output of the generator, with no resistance in its field circuit, being slightly greater than is necessary to run the fan at full speed, connection *k* is then adjusted until there is just enough of the resistance *gf* in the field circuit for the fan motor to be run at full speed. As with Fig. 1, contacts *c c'* will close when the correct pressure is reached, energizing the cancelling winding *t'* and causing contacts *s* to open, thus putting the rest of the resistance *gf* in the generator field circuit. Output voltage is then too low and the speed of motor F falls, after which the relay T continues to vibrate as before to control the voltage supplied to the motor F to keep the fan running at minimum speed. Connection *n* is then adjusted to cut out some of the resistance *gf* until the regulator stops vibrating. Under these conditions, the power consumed by motor F is reduced to 160 watts, or less than a third of full load consumption. After that, the regulator operates as before to run the motor F at just the right speed to deliver the amount of wind being used. What is actually happening is that the motor is being supplied with a series of full-voltage kicks of varying frequency and duration, exactly in accordance with what is required.

In the application of this regulating method to any other organ, it will probably be argued that it would not work where different pressures are taken off at different stages of a multi-stage blower. That is true. But there are many cases where only one pressure is used or where the pressures differ so slightly that there would be no objection to blowing all the wind at the highest pressures and taking the various lower pressures off a main reservoir in known manner. That is what is done with the organ in the present case. Where there are wide differences of pressure, as when reeds are in use, the installation is usually large enough to justify separate and smaller motors and fans for those pressures which are wide apart. Each of these could then be supplied at constant voltage and regulated in the manner described in connection with Fig. 1.



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* * EDITORIAL

TWO OF THE LATE G. DONALD HARRISON'S greatest achievements were the organs at Groton School and at the Tabernacle in Salt Lake City. These instruments are regularly under the hands of Edward B. Gammons and Alexander Schreiner, respectively, who are therefore well qualified to describe the musical resources and virtues which it is their privilege to command. They have done so in this issue of the ORGAN INSTITUTE QUARTERLY in two interesting articles that, in a sense, memorialize the creator of these celebrated organs.

In the period immediately after the installation of the Groton organ (in 1935) it was used for a number of recitals. The editor played two of these concerts, and as a result of this experience he considers the Groton organ to be the most outstanding organ in the United States and the high point of development in the electric-action era. There can be little doubt that the Salt Lake City organ belongs in the same category.

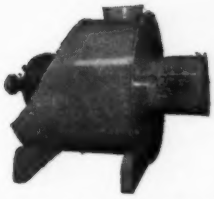
It comes as something of a surprise to be reminded, in Mr. Gammons' article, that G. Donald Harrison, who was probably the first American builder to re-introduce the traditional methods of laying out pipe scales, was as recently as 1935 still using the system of uniform scales designated by numbers ("44," "56," et cetera) that prevailed in this country during the late, but not lamented, decadent period, for some stops.

For the benifit of readers who are only familiar with the modern (and the traditional) method of planning the scale of each set of pipes in accordance both with their musical function alone and in combinations, and with the way the human ear hears, these numbers refer to a stand-

BRIEFS ★ ★ ★

ard set of pipe diameters, of which number one is one meter, halving uniformly on the sixteenth pipe. While this system was in vogue the then current voicing methods permitted wide latitude for regulating the loudness of each pipe at the toe. With the reestablishment of traditional voicing practices the dimensions of each pipe have once more become important determinants of strength and quality. Hence the "special compound scales" in the Groton specification, and in the work of all leading contemporary builders.

C. HORACE CLARKE HAS PERFECTED AN ingenious method of controlling the operation of an electric blower in accordance with the wind requirements of the music being played. It effects a considerable reduction in the amount of electricity consumed. This development could be of the highest importance. Since the return to normal wind pressures blowers have become smaller and more economical. The editor shudders to thing of the small fortune that his daily practice schedule must have cost the institution in which he for seven years presided over an instrument whose blowers were rated at twenty-two-and-a-half horse-power! Such shocking excesses are fortunately a thing of the past. Modern European organbuilders are making excellent small organs at prices that are comparable to the purchase price of American electronic instruments. Their blowers are rated at one-half, one-quarter, and even less, horsepower. If Mr. Clarke's invention could be applied to one of these, then the cost of operation, as well as the original cost, of a good pipe organ, would be comparable to that of an electronic.



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FRANKLIN S. MILLER'S SUCCINT COMments on the Agony of Modern Music were received too late for inclusion in the last issue. Readers will take satisfaction in adding his thought to the previously published articles on this book by Russell Hancock Miles and Leonard Raver.

AT LONG LAST THE FAMOUS BOOK, L'ART du Facteur d'Orgue, by Dom Bédos de Celles, is to become available in English. Beginning in this issue, significant passages from it will appear, from time to time, in the ORGAN INSTITUTE QUARTERLY, translated by Dr. William Leslie Sumner.

LEONARD ELLINWOOD, AUTHOR OF THE History of Church Music in the United States, has given us an interesting account of music in one of the most important churches in America, Washington Cathedral. Because of his association with the Cathedral and Paul Callaway Mr. Ellinwood can write authoritatively and intimately of the exemplary musical program in this great shrine.

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OBSERVATIONS ON THE AGONY OF MODERN MUSIC

The author does not appear to be on particularly solid historical ground when he writes: "The last really modern serious composer, (who) spoke with the full authority of the cultural forces of his time, was Wagner." Wagner himself refutes such a standpoint. He had no use for "contemporary taste" or "contemporary musical requirements." In a letter to Hans von Bülow dated October 7, 1859, Wagner writes: "Of what concern is it to you, me, and our few genuine friends—this futile question about popularity? Why give it any attention at all? There are many things which we are willing to allow just among ourselves . . . " And again, and even in a stronger vein he writes, in November of 1849 to Theodor Uhlig: "I can therefore find friends only in those regions which are *entirely apart from the dominant reaches of public life* . . . We have the strength to do so—given time—if we will realize ourselves as apostles of a new religion, . . . Let us hold fast to youth, and let age perish, for there is nothing to hold to in it!" (Italics mine.) Now this is certainly not the voice of a man who was conscious of "any consisderable segment of contemporary taste." In fact, Wagner is the father of the "Kunst der Zukunft"—"The Art of the Future"!! Futhermore, Mr. Pleasants' statement that "previously, it could always be said that composers represented the taste and the emotional and intellectual characteristics of their own time," is simply not historically tenable. Beethoven was completely misunderstood—still is, for that matter!—and Mozart was a child prodigy, but could not achieve success as an adult performer or musician; the Vienna Philharmonic members put down their instruments and refused to even rehearse the Shubert C major symphony at its first reading. They protested that it was too difficuult to play, and too complex to understand or execute.

Countless other examples of composers who were ahead of their time may be cited. In a famous discourse of 1600 ("Delle imperfezioni delle moderna musica," "On the imperfections of modern music"), the Italian theorist G.M. Aartus has this to say of the *modern* music of various Italian madrigalists, in particular Claudio Monteverdi: "They are harsh to the ear, rather offending than delighting it, and to the good rules left by those who have established the order and the bounds of this science they bring confusion and imperfection of no little consequence." (Second discoures) This might come from the writing of the author in question, or from anyone who seeks to condemn the works of a Stravinsky, Riegger, Schönberg or Hindemith.

It is expedient to remember, at this point, that history has shown the futility of condemning the practice of one era, because invariably certain apparent "imperfections" eventually come to be accepted as perfectly natural. For example, the use of the dominent seventh chord was practically outlawed in the time of Monteverdi, and it was his use of it, among other things, which prompted Artusi to his tirade on modern music. In the realm of harmonic languages alone, we observe eloquent examples of evolution among chord structures, and the diminished seventh is also condemned, admired, used and discarded as unsuitable, as its use continues throughout different

eras of history. Think of the harmonic language of "Tristan," at the time a radical departure from accepted Romantic harmony, or the whole-tone scale of Debussy. All have gone through a metamorphosis, so that today, they all, dominant seventh, diminished seventh, whole-tone scales and chords, have all become commonplace, one might even say passé.

Obviously then, the question remains whether the harmonic language of a Bartok (not to mention his rhymthmic sense, which is another story), or a Schönberg, Stravinsky, Berg, Hindemith or Krenek, will not eventually become an accepted and not too unusual or shocking part of the complete muscial expression of our era. Indeed, this is already setting in. Stravinsky, in his "Poetics of Music" observes that there are still some people who do like his "Firebird," which is seemingly, outdated, old-fashioned and primitive compared to his later works of the past ten years. I think it can be seen that there exists an incomplete basis here, upon which to base a value judgement where we attempt to appraise a musical work created within the framework of our own milieu. We live too close for objective judgement. Time—the greatest judge—must be our basis or criterin. However, history has shown the dange inr too quickly damning a work of art, or even a particular style in art.

As regards Mr. Pleasants' thesis that jazz, is the only really living or valid music of our population, since, as I believe he postulates, it expresses "contemporary taste," I think it must be pointed out that the public for jazz is limited. Jazz is a musical expression which appeals to a comparatively small number of our population. It would be far more in order to select the contortions of an Elvis Presley, or his numerous detractors, or the hill-billy songs of Hank Williams, as representative of our "contemporary taste." (I have worked as a radio disc jockey for two years, so I feel I have had an opportunity to feel the pulse, so to speak, of the average person who listens to radio, or buys the records in the music stores.)

Lastly, jazz can never achieve a place of importance as a monument of contemporary society, for it lacks one of the essentials which any art form must possess if it is to express a society—namely: craftmanship. Because of its essentially improvisational character it cannot hope to catch nor to crystallize any important segment of a stylistic evolution. It may be pointed out that in the past, the great composers Bach, Mozart and Beethoven, were skillful extempore performers, but it should also be borne firmly in mind that what has come down to us today are not the improvisations of the moment, but the written out works, works which show the most intense and logical working out, as witness the Beethoven sketch-books.

In closing, I think it can be shown, that, at no time in the history of music, or in the other arts, for that matter, was the creative person "speaking with the full authority of the cultural forces of his time." They expressed, these artists, the general temper of the time, true, but they prophetically saw through the superficiality to the expression, the true expression of that "Zeitgeist." In other words they were ahead of the time, in expressing the temperament of their time. However, it is true, I feel, that, as Wylie Sypher says "the internal changes always going on in society are inevitably reflected in the emergence of new styles in the arts, each with its own evolution, transformation, and eventual disappearance. A style is only an aspect of the course of a larger history . . . " ("Four Stages of Renaissance Style," Anchor Books published by Doubleday).

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